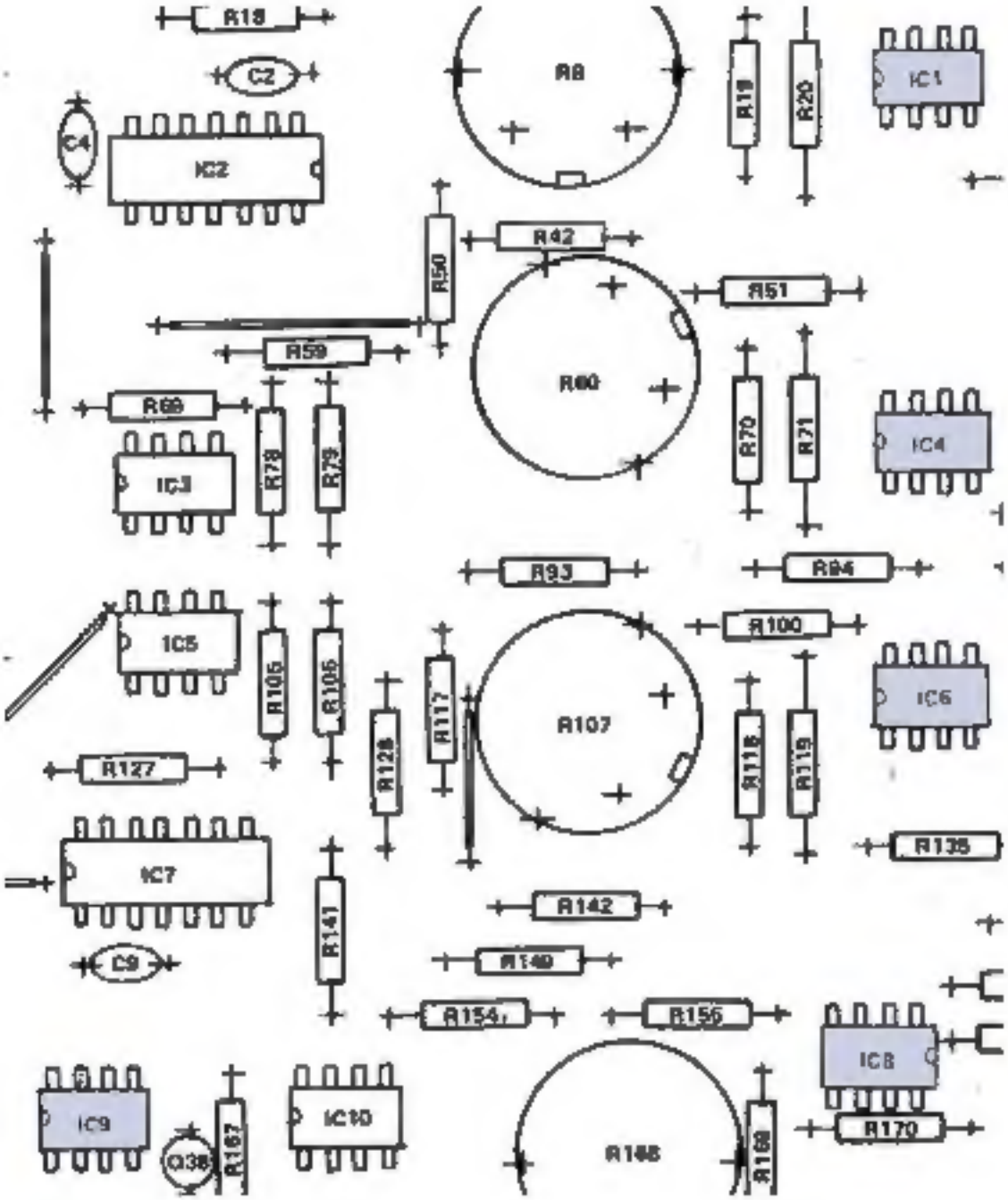
For less drift with Mini VCOs
Replace IC1, IC4, IC6, IC8 and IC9 with LT1006 opamps.
(all opamps except IC3, IC5 and IC10)
Make sure range switching and summing resistors are matched.



SECTION 8
MODIFICATIONS

8.1 SERVICE BULLETINS

Minimoog Service Bulletins are issued as necessary to increase product capability or to enhance performance. These are included in this manual assuming the information contained therein may be necessary for future maintenance. Each bulletin is identified by title.

8.2 OSCILLATOR BOARD ASSEMBLY (Board 1, Serial Numbers between 1300 and 10175)

Subject: To improve tracking and pitch stability.

Modifications:

1. Change R69, R105 and R141 from 6.8K ohms to 15K ohms, 1/2W, ± 5% carbon.

2. Replace R78, R106 and R128 with RC Network, part number 949-041129-001.

3. Change R181 from 56K ohms to 51K ohms, 1/2W, ± 5%, carbon.

4. Change R170 from 15K ohms, ± 5% to 15K ohms, ± 1%, metal film.

5. Change R162 from 3K ohms, ± 5% to 3.01K ohms, ± 1%, metal film.

6. Change C3, C5 and C7 from 47pf to 100pf.

All parts listed are available in kit form, part number 997-043185-001.

8.3 CONTOUR GENERATOR ASSEMBLY (Board 2, Serial Numbers below 2000)

Subject: To reduce thumping which may occur when a key is depressed.

Modification:

Add a 10pf capacitor between pin 4B and pin 5B on the contour generator printed circuit board.

8.4 POWER SUPPLY ASSEMBLY (Board 3, Serial Numbers below 2000)

Subject: To reduce oscillator bleed-through and cross modulation.

Modification:

Replace 10 ohm resistor next to the +10V ADJ trim pot with a straight wire. Make sure wire does not touch the body of +10V ADJ trimpot.

8.5 FILTER ASSEMBLY (Board 4, Serial Numbers below 2000)

Subject: To reduce intermodulation distortion which occurs when mixing two or more signals.

Modifications:

1. Change R2 from 47K ohms to 160K ohms.

2. Change R8 and R28 from 27 ohms to 4.7 ohms.

3. Change R40 from 1K ohms to 10K ohms.

8.6 KEYBOARD CIRCUIT PRINTED CIRCUIT BOARD NO. 2

This modification is estimated to require 1 hour to perform. (Serial Numbers in the 7000's).

Pitch drift when key is released (DECAY switch on), keyboard circuit not sampling voltage consistently (correct pitch inconsistent) or keyboard circuit not functioning at all.

8.6.1 REASON

Excessive printed circuit board leakage caused by contaminants in board is usually only exhibited in humid conditions where moisture is apparently absorbed by the board. The keyboard sample and hold circuit is high impedance and is affected by this leakage.

8.6.2 MODIFICATION

Critical circuit components should be lifted off the board and soldered point-to-point on top of the board to eliminate any chance of voltage leakage from nearby traces to these critical areas. The accompanying schematic diagram shows the area affected by the leakage. The printed circuit board diagram shows leads lifted, jumper wires in place, and sections of traces to be cut. (Figure 8-1).

1. Lift the gate of Q10 and the drain of Q13. Bend the drain of Q13 under the transistor and bring it up between its source and gate.

2. Remove R21 (10K) from the board and solder it point-to-point (gate Q10 to drain Q13) on top of the board.

3. Solder a jumper wire from the drain of Q13 to the lead of C6. The lead of C6 must be either lifted from the board or the trace cut as shown.

Route a trace with a -10 volt potential away from the gate of Q13. This trace supplies R18 (3.9K), R34 (100K), R52 (43K) and R54 (1.5K) with -10 volts.

1. Cut this trace just above R52 and just below R18 as shown.

2. Lift the leads of R34 and C13.

3. Connect a jumper from R18 to R34 and C13 to R52.

8.7 MINIMOOG OSCILLATOR TUNING (Serial Numbers around 4185)

Subject: With filter contour ATTACK at some duration other than "0", oscillator number 2 appears to have a slight amount of glide present. At the end of the selected duration, oscillator number 2 settles. This only occurs when a new trigger is generated, as by high stepping the keyboard.

Reason: Contour generator board 2 transistors Q1, Q4, Q6, Q7 and Q23 have been previously replaced with Motorola M62272A.

Modification:

Replace M62272A transistors with the normally used 2N3392.

8.8 OSCILLATOR BOARD 1, POWER SUPPLY CONNECTION AND OCTAVE BUFFER

Subject: Stabilized Oscillator Installation and Tuning (Serial Numbers below 10175).

Power Supply Connection Modification (All Serial Numbers).

Octave Buffer Kit Installation (Serial Numbers below 5000). Supercedes Bulletin M101 Octave Buffer Installation.

These out-of-warranty modifications are summarized below for labor estimation purposes by an authorized Moog Service Center:

Stabilized Oscillator Installation .... 1.0 hours
Octave Buffer Installation..... 1.5 hours

MODIFICATION PARTS LIST

PART NUMBER	DESCRIPTION	QTY.
997-043299-001	Stabilized Oscillator Kit consisting of:	1
996-041928-002	Stabilized Oscillator Board	1
913-043293-001	Template for rear panel	1
977-041638-003	Grommets	13
908-043294-001	Insulating "Fish" Paper for main frame	1

8.8.3 SCALE TRIMPOT ADJUSTMENTS

a. Set octave RANGE at 8′. Refer to Note 1.

b. Press low A (55Hz) and zero beat with shift trimpot. Refer to Note. 2.

c. Press high A (440Hz) and zero beat with scale trimpot.

d. Repeat steps b and c until low A and high A zero beat.

8.8.4 HIGH END CONPENSATION

a. Octave range is 2′. Refer to Note 1 and substitute 2′ for 8′.

b. Press low A (440Hz) and zero beat with shift trimpot. Refer to Note. 2.

c. Press high A (3520Hz) and zero beat with high end trimpot.

d. Repeat steps b and c until low A and high A zero beat.

e. Recheck paragraph 8.8.3 and repeat paragraphs 8.8.3 and 8.8.4 if necessary.

8.8.5 OCTAVE ADJUSTMENT

a. Octave RANGE is 32′. Refer to Note 1 and substitute 32′ for 8′.

b. Press high A (220Hz) and zero beat using shift trimpot. Refer to Note. 2.

c. Octave RANGE is 2′. Refer to Note 1 and substitute 2′ for 8′.

d. Press high A (3520Hz) and zero beat using octave trimpot.

e. Repeat steps a,b,c, and d until both 32′ and 2′ zero beat.

8.8.6 SHIFT TRIMPOT ADJUSTMENT

Press A^3 (440Hz) and zero beat using shift trimpot. Refer to Note 1.

NOTE

The Minimoog is now in tune. Because of the very precise tracking of the three oscillators on the new board, it may seem at times that the instrument does not produce the "fat" rich, multiple oscillator sound. This is not the result of a change in the sound of the oscillator but can be the result of setting the oscillators too precisely at the same pitch. To achieve the rich sound, it will be necessary for the player to detune the front panel oscillator frequency control as desired for a rich, rolling sound.

8.8.7 POWER SUPPLY CONNECTION MODIFICATION

In the event that all oscillators appear to change scale or frequency, the power supply and/or power supply connectors are probably affecting the oscillator as well as the keyboard current drive circuitry.

To ensure that the power supply sense lines are terminated properly with the lowest possible resistance, solder the appropriate main harness wires to the "individual flag" lugs located in the printed circuit board connectors. (Figure 8-5).

The points are as follows:

Connector CO1A, Pins 17, 18, 19,
-5 volt supply, Board 1 Connector.

Connector CO1B, Pins 1, 2, 3, 4, 5, 6,
Main supply, Board 1 Connector.

Connector CO3, Pins 13, 14, 15, 16, 19, 20,
Main supply, Board 3 Connector.

Flag tools (Part Number 961-043266-001) are available from the factory to remove the "flag" lugs from the nylon AMP connectors. With care, a paper clip can be used in an emergency.

POWER SUPPLY CONNECTION MODIFICATION

In the event that all oscillators appear to change scale or frequency, the power supply and/or power supply connectors are probably affecting the oscillator as well as the keyboard current drive circuitry.

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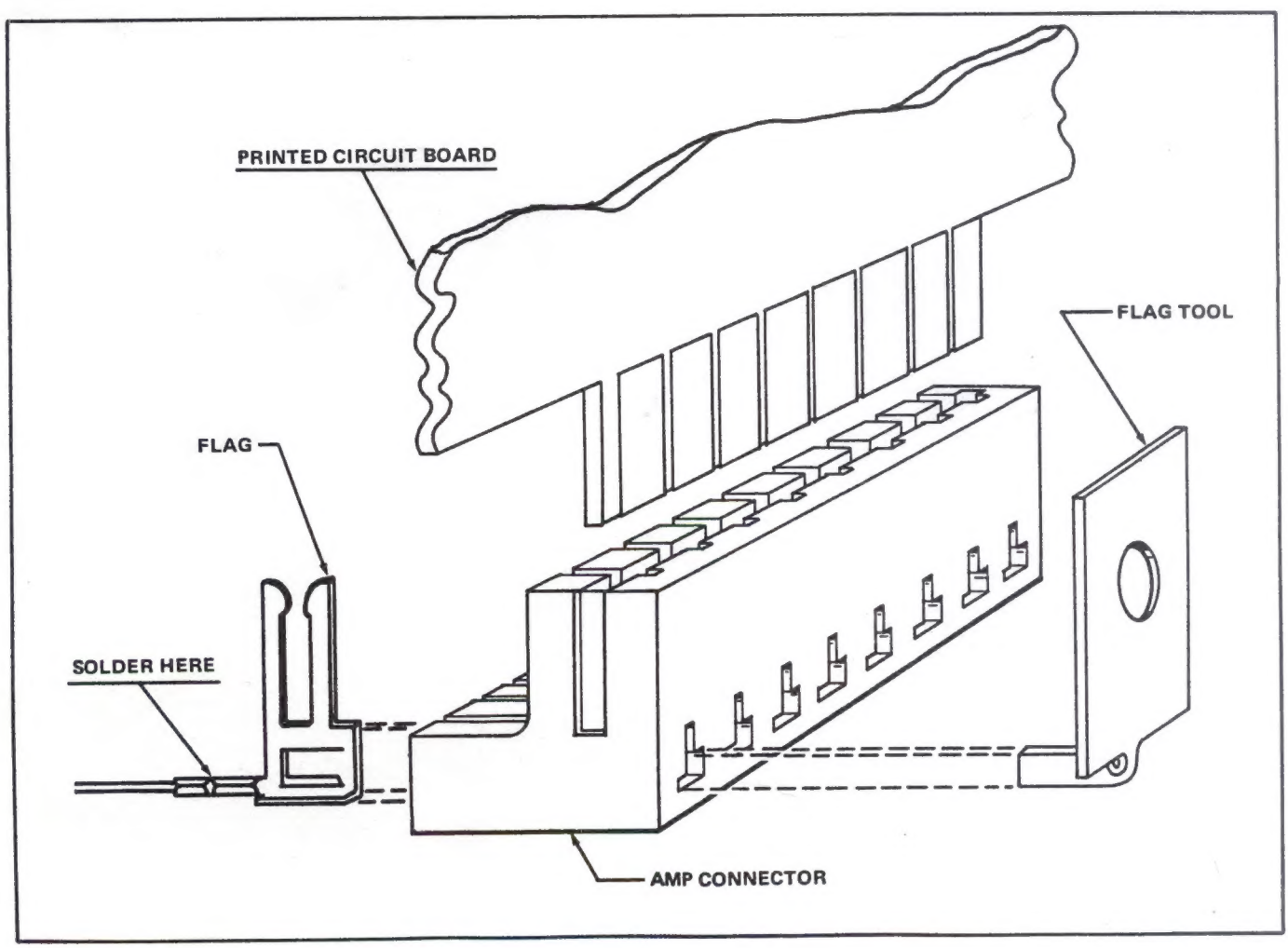
The points are as follows:

Connector CO1A	Pins 17, 18, 19	-5 volt supply	Board 1 Connector
Connector CO1B	Pins 1, 2, 3, 4, 5, 6	Main supplies	Board 1 Connector
Connector CO3	Pins 13, 14, 15, 16, 19, 20	Main supply	Board 3 Connector

Flag tools (Part No. 961-043266-001) are available from the factory to remove the "flag" lugs from the nylon AMP connectors. With care, a paper clip can be used in an emergency.

Each metal "flag" lug is constructed so that a one-way mechanical latch, consisting of a spring clip, locks the "flag" lug into the nylon connector housing. To remove the "flag", the tool is inserted into the connector as shown. This releases the spring clip. Using needlenose pliers, gently pull the associated wire straight out of the connector. The "flag" should freely slide out with the wire. Excessive force indicates that the spring clip is still engaged. When replacing, simply slide the "flag" back until it locks itself in place.

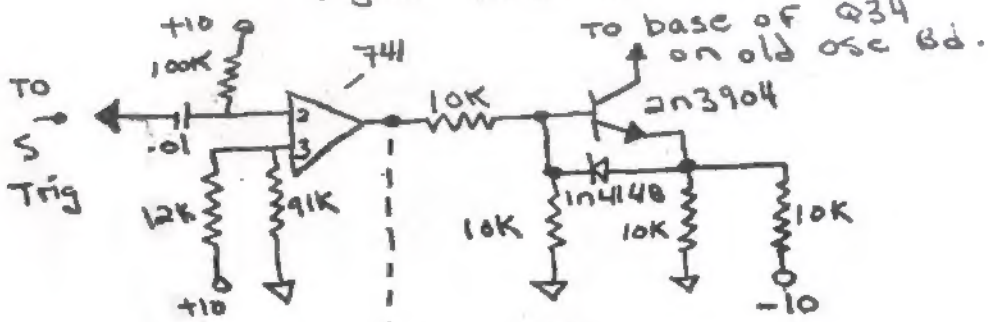


THIS IS A COLLECTION OF MODS FOR MINIMOOG MODEL D SYNTHESIZERS.

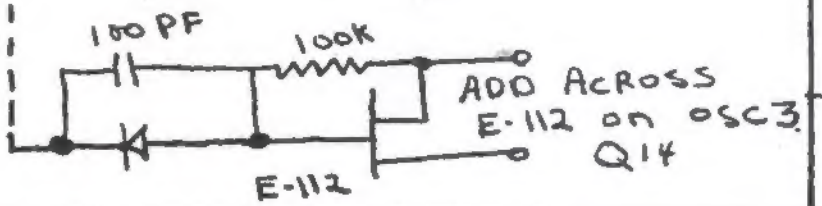
THESE ARE NOT MY (SYNTHFOOL) MODS AND I DO NOT ENDORSE OR SUPPORT EVERY MOD PRESENTED.

PERFORM AT YOUR OWN RISK AND/OR ENJOYMENT.

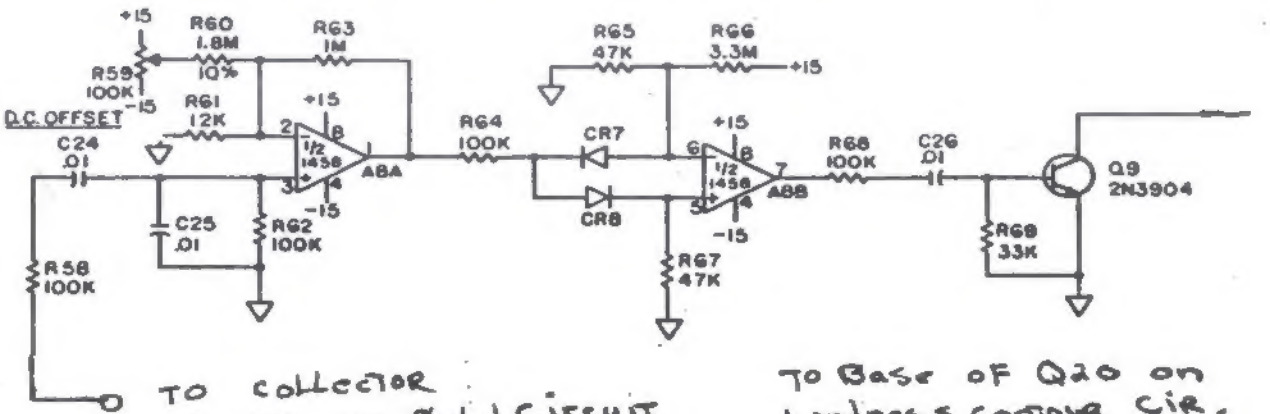
OSC 3 mod Reset, Preset "Jan Hammers"



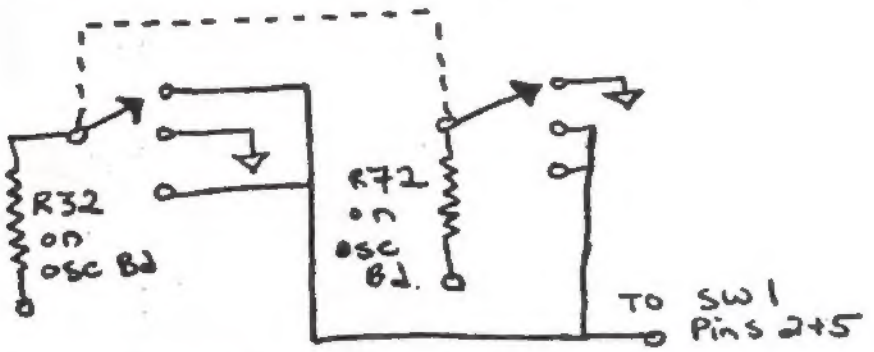
FOR new Board.



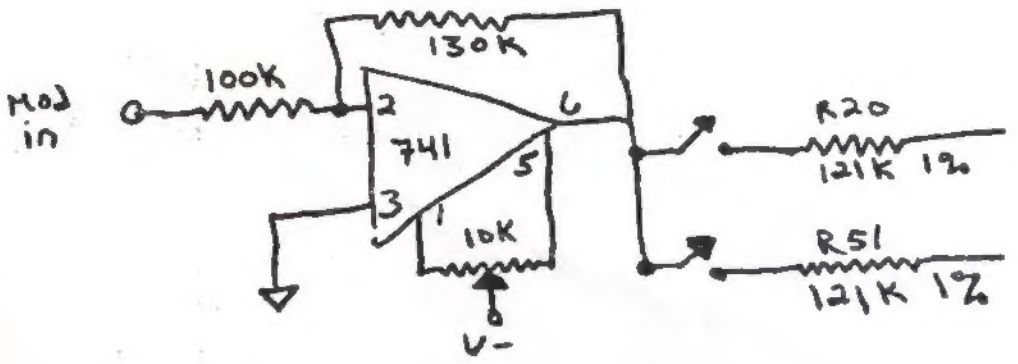
Single - multiple Trigger



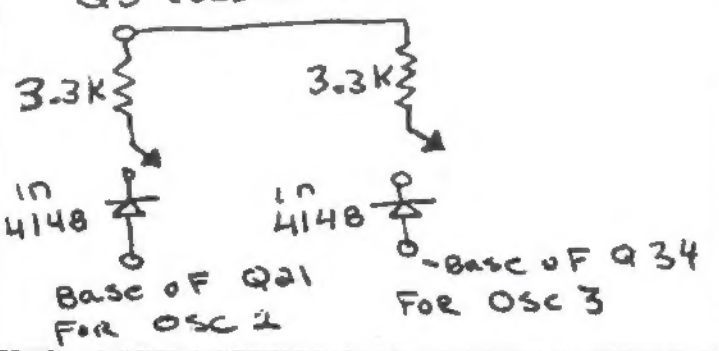
Modulation routing Sw. For old Bd.



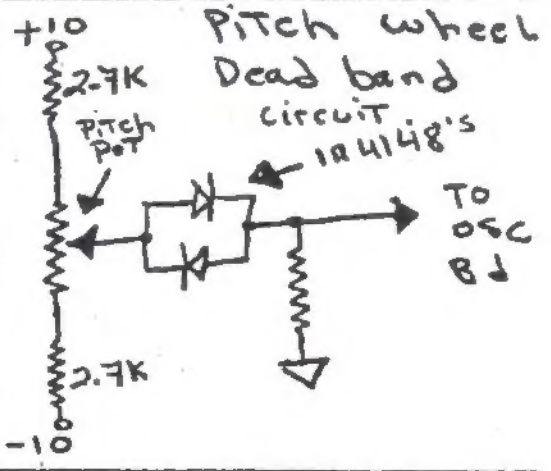
Mod routing For New Bd.



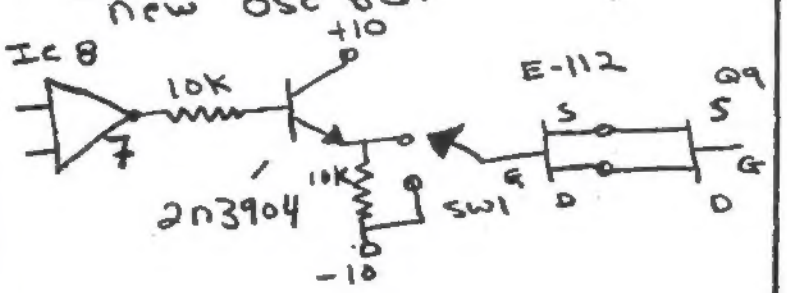
Sync Modification old osc Bd



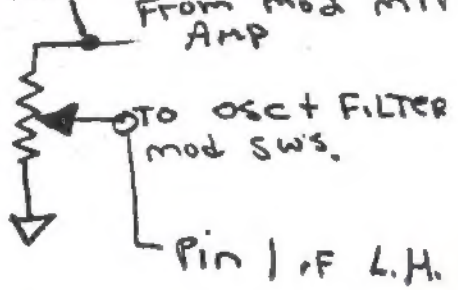
Pitch wheel Dead band circuit



Sync Modification For new osc Bd.



Modulation Bleed Throu circuit.



CUT Jumper wire on L.H.C. Pins 1+2.

Before performing these procedures, read instructions specified in paragraph 5-4.

Replace pages 5-5 and 5-6 with this updated procedure. The replacement page may be stapled over the original.

TABLE 5-3
OSCILLATOR TUNING PROCEDURE
(Serial Numbers Below 10175)

TO ADJUST	FOLLOW THESE PROCEDURES:
Oscillator 1 Tuning	1. Set up the front panel and left hand controller as shown in Fig. 5-5. 2. Connect an oscilloscope, monitor amplifier and a stribe-tuner (preferred) or frequency counter to the high main output jack. 3. Depress high "A" and adjust oscillator 1 range trimpot for 1760 Hz. 4. Depress low "A" and adjust oscillator 1 scale trimpot for 220 Hz. 5. Repeat steps 3 and 4 until no further improvement is attainable.
Octave Tuning	6. Turn the oscillator 1 range switch to 32'. Depress high "A" and adjust the octave trimpot for 220 Hz. 7. Turn the oscillator 1 range switch to 4'. Depress high "A" and adjust oscillator 1 range trimpot for 1760 Hz. 8. Repeat steps 6 and 7 until no further improvement is attainable. 9. The octave adjustment has a slight effect on scaling, therefore, check steps 3 through 7 and perform any adjustments necessary.
Oscillator 2 Tuning	10. Turn on the oscillator 1 and 2 mixer switches. 11. Depress high "A" and adjust oscillator 2 range trimpot to zero beat (unison) with oscillator 1 (1760 Hz). 12. Depress low "A" and adjust oscillator 2 scale trimpot to zero beat (unison) with oscillator 1. (220Hz). 13. Repeat steps 11 and 12 until no further improvement is attainable. 14. Turn off the oscillator 2 mixer switch.
Oscillator 3 Tuning	15. Turn on the oscillator 1 and 3 mixer switches. 16. Depress high "A" and adjust oscillator 3 range trimpot to zero beat (unison) with oscillator 1. (1760 Hz). 17. Depress low "A" and adjust oscillator 3 scale trimpot to zero beat (unison) with oscillator 1. (220 Hz). 18. Repeat steps 16 and 17 until no further improvement is attainable.